

Notice of Allowability

Application No.

10/779,944

Examiner

Larry D. Donaghue

Applicant(s)

JOY ET AL.

Art Unit

2154

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to papers filed 02/17/2007.
2. ☒ The allowed claim(s) is/are 1-4, 7-18 and 20-21.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

LARRY D. DONAGHUE
PRIMARY EXAMINER

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1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

The application has been amended as follows:

On page 1, replace the section titled CROSS REFERENCE with the following:

CROSS-REFERENCE

This application is a continuation of Application No. 10/074,419, now U.S. Patent 6,694,347, filed February 12, 2002, which is itself a divisional of Application No. 09/309,735, filed May 11, 1999, now U.S. Patent 6,507,862. Application Nos. 10/074,419 and 09/309,735 are each incorporated, by reference herein, in their entirety.

The present invention is related to subject matter disclosed in the following copending patent applications:

1. U.S. patent application Ser. No. 09/309,732, now U.S. 6,938,147, entitled "Processor with Multiple-Thread, Vertically-Threaded Pipeline" naming William Joy, Marc Tremblay, Gary Lauterbach, and Joseph Chamdani as inventors and filed on even date herewith;
2. U.S. patent application Ser. No. 09/309,731, now U.S. Pat. No. 6,351,808, entitled "Vertically-Threaded Processor with Multi-Dimensional Storage" naming William Joy, Marc Tremblay, Gary Lauterbach, and Joseph Chamdani as inventors and filed on even date herewith;
3. U.S. patent application Ser. No. 09/309,730, now abandoned, entitled "Multi-Threaded Processor By Multiple-Bit Flip-Flop Global Substitution" naming William Joy, Marc Tremblay, Gary Lauterbach, and Joseph Chamdani as inventors and filed on even date herewith;
4. U.S. patent application Ser. No. 09/309,734, now U.S. Pat. No. 7,185,185 entitled "Multiple-Thread Processor with Single-Thread Interface Shared among Threads" naming William Joy, Marc Tremblay, Gary Lauterbach, and Joseph Chamdani as inventors and filed on even date herewith; and
5. U.S. patent application Ser. No. 09/309,733, now U.S. Pat. No. 6,341,347, entitled "Thread Switch Logic in a Multiple-Thread Processor" naming William Joy, Marc Tremblay, Gary Lauterbach, and Joseph Chamdani as inventors and filed on even date herewith.

Replaced page 8 with the following:

techniques and system implementations that improve multithreading performance and functionality. FIGURE 13 is a schematic perspective diagram showing a multi-dimensional register file.

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FIGURE 14 is a schematic circuit diagram showing a conventional implementation of register windows.

FIGURE 15 is a schematic circuit diagram showing a plurality of bit cells of a register windows of the multi-dimensional register file that avoids waste of integrated • circuit area by exploiting the condition that only one window is read and only one window is written at one time.

FIGURE 16 A –and 16-B, a schematic circuit diagram illustrates a suitable bit storage circuit storing one bit of the local registers for the multi-dimensional register file with eight windows.

FIGURE 17A and 17B are, respectively, a schematic pictorial diagram and a schematic block diagram illustrating sharing of registers among adjacent windows.

FIGURE 18 isA-18D a schematic circuit diagram illustrating an implementation of a multi-dimensional register file for registers shared across a plurality of windows.

The use of the same reference symbols in different drawings indicates similar or identical items.

DESCRIPTION OF THE EMBODIMENT(S)

Referring to FIGUREs 1A and 1B, two timing diagrams respectively illustrate execution flow 110 in a single-thread processor and instruction flow 120 in a vertical multithread processor. Processing applications such as database applications spend a significant portion of execution time stalled awaiting memory servicing. FIGURE 1A is a highly schematic timing diagram showing execution flow 110 of a single-

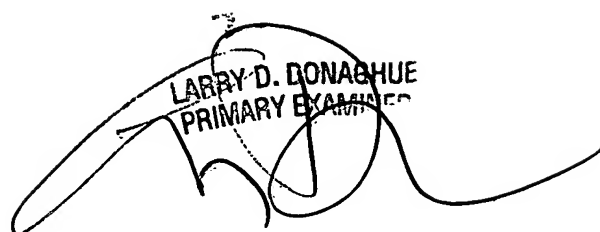
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Larry D. Donaghue whose telephone number is 571-272-3962. The examiner can normally be reached on M-F 8:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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LARRY D. DONAGHUE
PRIMARY EXAMINER

A handwritten signature in black ink, consisting of a series of loops and a long horizontal stroke, is written over the printed name and title.